Amendments to the Claims

Please amend the claims as follows:

1. (currently amended) A method of forming a nitride barrier layer, comprising:

exposing a dielectric material to a silicon-containing gas under low partial pressure to deposit a continuous layer of silicon over the dielectric material; and

exposing the silicon layer to a nitrogen-containing gas to nitridize the silicon layer to form a continuous silicon nitride dopant diffusion barrier layer effective to inhibit passage of a dopant therethrough into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

2. (previously presented) The method of Claim 1, wherein the dielectric material is exposed to the silicon-containing gas at a partial pressure of about 10^{-2} Torr or less.

3. (previously presented) The method of Claim 1, wherein the dielectric material is exposed to the silicon-containing gas at pressure of about 10^{-2} to about 10^{-7} Torr.

4. (previously presented) The method of Claim 2, wherein the dielectric material is exposed to the silicon-containing gas at a temperature of about 500°C to about 700°C.

5. (currently amended) A method of forming a nitride barrier layer, comprising:

irradiating a dielectric material with a silicon-containing gas under low partial pressure to nucleate the dielectric material with a continuous layer of silicon; and

exposing the silicon layer to a nitrogen-containing gas to form a continuous silicon nitride dopant diffusion barrier layer effective to inhibit passage of a dopant therethrough into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

6. (canceled)

7. (currently amended) A method of forming a nitride barrier layer, comprising:

exposing a dielectric material to a silicon-containing gas under low partial pressure to deposit a continuous layer of silicon over the dielectric material; and

nitridizing the silicon layer in a nitrogen-containing gas to form a continuous silicon nitride dopant diffusion barrier layer effective to inhibit passage of a dopant therethrough into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

8. (currently amended) A method of forming a nitride barrier layer, comprising:

exposing a surface of a dielectric material to a silicon-containing gas at a low partial pressure to nucleate the surface of the dielectric material and form a continuous layer of silicon thereon; and

exposing the silicon layer to a nitrogen-containing gas to form a continuous silicon nitride dopant diffusion barrier layer effective to inhibit passage of a dopant therethrough into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

9. (currently amended) A method of forming a nitride barrier layer, comprising:

exposing a dielectric material to a silicon-containing gas at a partial pressure of about 10^{-2} Torr or less to deposit a continuous layer of silicon thereon; and

nitridizing the silicon layer to form a continuous silicon nitride dopant diffusion barrier layer effective to inhibit passage of a dopant therethrough into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

10. (previously presented) The method of Claim 9, wherein the dielectric material is exposed to the silicon-containing gas at a temperature of about 500°C to about 700°C.

11. (previously presented) The method of Claim 9, wherein the silicon-containing gas is selected from the group consisting of dichlorosilane, silicon tetrachloride, silane, and disilane.

12. (previously presented) The method of Claim 9, wherein exposing the dielectric material to the silicon-containing gas is by plasma enhanced chemical vapor deposition, low pressure chemical vapor deposition, or rapid thermal chemical vapor deposition.

13. (previously presented) The method of Claim 9, wherein the silicon-containing gas is deposited by rapid thermal chemical vapor deposition at about 500°C. to about 700°C.

14. (previously presented) The method of Claim 9, wherein the dielectric material comprises silicon dioxide.

15. (withdrawn) The method of Claim 9, wherein the dielectric material comprises a dielectric material selected from the group consisting of tantalum pentoxide, hafnium dioxide, and aluminum trioxide.

16. (currently amended) A method of forming a nitride barrier layer, comprising:

exposing a dielectric material to a silicon-containing gas at a partial pressure of about 10^{-2} to about 10^{-7} Torr to nucleate the dielectric material and form a continuous layer of silicon; and

exposing the silicon layer to a nitrogen-containing gas to form a continuous silicon nitride dopant diffusion barrier layer effective to inhibit passage of a dopant therethrough into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

17. (currently amended) A method of forming a nitride barrier layer, comprising:

exposing a dielectric material to a silicon-containing gas at a partial pressure of about 10^{-2} to about 10^{-7} Torr, a temperature of about 500°C. to about 700°C., and a duration of about

1 second to about 5 minutes, to nucleate the dielectric material and form a continuous layer of silicon; and

exposing the silicon layer to a nitrogen-containing gas to form a continuous silicon nitride dopant diffusion barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

18. (currently amended) A method of forming a nitride dopant diffusion barrier layer, comprising:

depositing a continuous silicon layer onto a dielectric material by exposing the dielectric material to a silicon-containing gas under low partial pressure; and

thermally annealing the silicon layer in a nitrogen-containing gas to form the nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

19. (currently amended) A method of forming a nitride dopant diffusion barrier layer, comprising:

depositing a continuous silicon layer onto a dielectric material by exposing the dielectric material to a silicon-containing gas under low partial pressure; and

exposing the silicon layer to a nitrogen-containing gas at a temperature of about 700°C. to about 900°C. to nitridize the silicon layer to form the nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

20. (currently amended) A method of forming a nitride dopant diffusion barrier layer, comprising:

depositing a continuous silicon layer onto a dielectric material by exposing the dielectric material to a silicon-containing gas under low partial pressure; and

exposing the silicon layer to a nitrogen-containing gas at a temperature of about 700°C. to about 900°C., a pressure of about 1 to about 760 Torr, and a flow rate of about 100 to about 10,000 sccm, for about 1 second to about 180 minutes to nitridize the silicon layer to form the nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

21. (previously presented) The method of Claim 20, wherein the nitrogen-containing gas is selected from the group consisting of nitrogen, ammonia, nitrogen trifluoride, nitrogen oxide, and a nitrogen-helium mixture.

22. (withdrawn) The method of Claim 21, wherein the silicon layer is exposed to a plasma source of nitrogen.

23. (withdrawn – currently amended) A method of forming a nitride dopant diffusion barrier layer, comprising:

depositing a continuous silicon layer onto a dielectric material by exposing the dielectric material to a silicon-containing gas under low partial pressure; and

exposing the silicon layer to a plasma source of a nitrogen-containing gas to nitridize the silicon layer to form the nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

24. (withdrawn) The method of Claim 23, wherein the plasma source of the nitrogen-containing gas is produced by a downstream microwave system, an electron cyclotron residence system, an inductive coupled plasma system, or a radio frequency system.

25. (withdrawn – currently amended) A method of forming a nitride <u>dopant diffusion</u> barrier layer, comprising:

depositing a continuous silicon layer onto a dielectric material by exposing the dielectric material to a silicon-containing gas under low partial pressure; and

exposing the continuous silicon layer to a remote microwave plasma source of a nitrogen-containing gas at a pressure of about 1 to about 20 Torr to nitridize the silicon layer to form the nitride <u>dopant diffusion</u> barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material<u>, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material</u>.

26. (withdrawn – currently amended) A method of forming a nitride <u>dopant diffusion</u> barrier layer, comprising:

depositing a continuous silicon layer onto a dielectric material by exposing the dielectric material to a silicon-containing gas under low partial pressure; and

exposing the silicon layer to a remote microwave plasma source of a nitrogen-containing gas at a pressure of about 1 to about 20 Torr, and a temperature of about 700°C. to about 900°C. to nitridize the silicon layer to form the nitride <u>dopant diffusion</u> barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material<u>, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material</u>.

27. (withdrawn – currently amended) A method of forming a nitride <u>dopant diffusion</u> barrier, comprising:

depositing a continuous silicon layer onto a dielectric material by exposing the dielectric material to a silicon-containing gas under low partial pressure; and

exposing the silicon layer to an inductive coupled plasma source of a nitrogen-containing gas at a pressure of about 1 to about 20 Torr to nitridize the silicon layer to form the nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

28. (withdrawn – currently amended) A method of forming a semiconductor device, comprising:

irradiating a dielectric material situated on a silicon substrate with a silicon-containing gas under low partial pressure to nucleate the dielectric material and form a continuous layer of silicon thereover; and

nitridizing the silicon layer to form a nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

29. (withdrawn) The method of Claim 28, wherein irradiating the dielectric material with the silicon-containing gas is at a partial pressure about 10^{-2} Torr or less.

30. (withdrawn) The method of Claim 29, wherein irradiating the dielectric material is at a partial pressure of about 10^{-2} to about 10^{-7} Torr.

31. (withdrawn) The method of Claim 29, wherein the silicon-containing gas is selected from the group consisting of dichlorosilane, silicon tetrachloride, silane, and disilane.

32. (withdrawn) The method of Claim 28, wherein irradiating the dielectric material with the silicon-containing gas is by plasma enhanced chemical vapor deposition, low pressure chemical vapor deposition, or rapid thermal chemical vapor deposition.

33. (withdrawn) The method of Claim 28, wherein irradiating the dielectric material with the silicon-containing gas is by rapid thermal chemical vapor deposition at a temperature of about 500°C to about 700°C.

34. (withdrawn) The method of Claim 28, wherein the dielectric material comprises silicon dioxide.

35. (withdrawn) The method of Claim 28, wherein the dielectric material comprises a dielectric material selected from the group consisting of tantalum pentoxide, hafnium dioxide, and aluminum trioxide.

36. (withdrawn – currently amended) A method of forming a semiconductor device, comprising:

exposing a dielectric material situated on a silicon substrate to a silicon-containing gas at a partial pressure of about 10^{-2} Torr or less to nucleate the dielectric material and form a continuous layer of silicon; and

nitridizing the silicon layer in a nitrogen-containing gas to form a nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

37. (withdrawn – currently amended) A method of forming a semiconductor device, comprising:

exposing an oxide layer situated on a silicon substrate to a silicon-containing gas at a partial pressure of about 10^{-2} Torr or less to nucleate the dielectric material and form a continuous layer of silicon; and

thermally annealing the silicon layer in a nitrogen-containing gas to form a nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

38. (withdrawn – currently amended) A method of forming a semiconductor device, comprising:

exposing an oxide layer situated on a silicon substrate to a silicon-containing gas at a partial pressure of about 10^{-2} Torr or less to nucleate the dielectric material and form a continuous layer of silicon; and

exposing the silicon layer to a nitrogen-containing gas at a temperature of about 700°C. to about 900°C. to nitridize the silicon layer to form a nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

39. (withdrawn – currently amended) A method of forming a semiconductor device, comprising:

depositing a silicon layer onto a dielectric material by exposing the dielectric material to a silicon-containing gas under low partial pressure to nucleate the dielectric material and form a continuous layer of silicon; and

exposing the silicon layer to a plasma source of a nitrogen-containing gas to nitridize the silicon layer to form a nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

40. (withdrawn) The method of Claim 39, wherein the plasma source of the nitrogen-containing gas is produced by a downstream microwave system, an electron cyclotron residence system, an inductive coupled plasma system, or a radio frequency system.

41. (withdrawn – currently amended) A method of forming a semiconductor device, comprising:

depositing a silicon layer onto a dielectric material by exposing the dielectric material to a silicon-containing gas under low a partial pressure of about 10^{-2} Torr or less to nucleate the dielectric material and form a continuous layer of silicon; and

exposing the silicon layer to a remote microwave plasma source of a nitrogen-containing gas at a pressure of about 1 to about 20 Torr to nitridize the silicon layer to form a nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

42. (withdrawn – currently amended) A method of forming a gate electrode, comprising:

exposing a gate oxide layer situated on a silicon substrate to a silicon-containing gas at a partial pressure of about 10^{-2} Torr or less to nucleate the gate oxide layer and form a continuous layer of silicon; and

exposing the silicon layer to a nitrogen-containing gas to form a silicon nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the gate oxide layer, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer.

43. (withdrawn – currently amended) A method of forming a gate electrode, comprising:

exposing a gate oxide layer situated on a silicon substrate to a silicon-containing gas at a partial pressure of about 10^{-2} to about 10^{-7} Torr to nucleate the gate oxide layer and form a continuous layer of silicon; and

exposing the silicon layer to a nitrogen-containing gas to form a silicon nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the gate oxide layer, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer.

44. (withdrawn – currently amended) A method of forming a gate electrode, comprising:

exposing a gate oxide layer situated on a silicon substrate to a silicon-containing gas at a partial pressure of about 10^{-2} to about 10^{-7} Torr, a temperature of about 500°C. to about 700°C., and a duration of about 1 second to about 5 minutes, to nucleate the gate oxide layer and form a continuous layer of silicon; and

exposing the silicon layer to a nitrogen-containing gas to form a silicon nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the gate oxide layer, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer.

45. (withdrawn – currently amended) A method of forming a gate electrode, comprising:

depositing a continuous silicon layer onto a gate oxide layer situated on a silicon substrate by exposing the gate oxide layer to a silicon-containing gas at a partial pressure of about 10^{-2} Torr or less; and

thermally annealing the silicon layer in a nitrogen-containing gas to form a nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the gate oxide layer, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer.

46. (withdrawn – currently amended) A method of forming a gate electrode, comprising:

depositing a continuous silicon layer onto a gate oxide layer situated on a silicon substrate by exposing the gate oxide layer to a silicon-containing gas at a partial pressure of about 10^{-2} Torr or less; and

exposing the silicon layer to a nitrogen-containing gas at a temperature of about 700°C. to about 900°C. to nitridize the silicon layer to form a silicon nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the gate oxide layer, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer.

47. (withdrawn – currently amended) A method of forming a gate electrode, comprising:

depositing a continuous silicon layer onto a gate oxide layer situated on a silicon substrate by exposing the gate oxide layer to a silicon-containing gas under low partial pressure; and

exposing the silicon layer to a nitrogen-containing gas at a temperature of about 700°C. to about 900°C., a pressure of about 1 to about 760 Torr, a flow rate of about 100 to about 10,000 sccm, for about 1 second to about 180 minutes to nitridize the silicon layer to form a nitride <u>dopant diffusion</u> barrier layer, said barrier layer effective to inhibit passage of a dopant into the gate oxide layer<u>, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer</u>.

48. (withdrawn) The method of Claim 47, wherein the nitrogen-containing gas is selected from the group consisting of nitrogen, ammonia, nitrogen trifluoride, nitrogen oxide, and a mixture of nitrogen and helium.

49. (withdrawn – currently amended) A method of forming a gate electrode, comprising:

depositing a continuous silicon layer onto a gate oxide layer situated on a silicon substrate by exposing the gate oxide layer to a silicon-containing gas at a partial pressure of about 10^{-2} Torr or less; and

exposing the silicon layer to a plasma source of a nitrogen-containing gas to nitridize the silicon layer to form a nitride <u>dopant diffusion</u> barrier layer, said barrier layer effective to inhibit passage of a dopant into the gate oxide layer<u>, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer</u>.

50. (withdrawn) The method of Claim 49, wherein the plasma source of the nitrogen-containing gas is produced by a downstream microwave system, an electron cyclotron residence system, an inductive coupled plasma system, or a radio frequency system.

51. (withdrawn – currently amended) A method of forming a gate electrode, comprising:

depositing a continuous silicon layer onto a gate oxide layer situated on a silicon substrate by exposing the gate oxide layer to a silicon-containing gas at a partial pressure of about 10^{-2} Torr or less; and

exposing the silicon layer to a remote microwave plasma source of a nitrogen-containing gas at a temperature of about 700°C. to about 900°C., and a pressure of about 1 to about 20 Torr to nitridize the silicon layer to form a nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the gate oxide layer, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer.

52. (withdrawn – currently amended) A method of forming a gate electrode, comprising:

depositing a continuous silicon layer onto a gate oxide layer situated on a silicon substrate by exposing the gate oxide layer to a silicon-containing gas at a partial pressure of about 10^{-2} Torr or less; and

exposing the silicon layer to an inductive coupled plasma source of a nitrogen-containing gas at a pressure of about 1 to about 20 Torr to nitridize the silicon layer to form a nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the gate oxide layer, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer.

53. (withdrawn – currently amended) A method of forming a gate electrode, comprising:

exposing a gate oxide layer situated on a silicon substrate to a silicon-containing gas at a partial pressure of about 10^{-2} to about 10^{-7} Torr to nucleate the gate oxide layer and form a continuous layer of silicon thereover;

nitridizing the silicon layer in a nitrogen-containing gas to form a silicon nitride dopant diffusion barrier layer, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer; and

forming a conductive polysilicon layer comprising a conductivity enhancing dopant over the nitride barrier layer; wherein the nitride barrier layer is effective to inhibit passage of the dopant from the conductive polysilicon layer into the gate oxide layer.

54. (withdrawn) The method of Claim 53, wherein the polysilicon layer comprises a boron dopant.

55. (withdrawn) The method of Claim 53, further comprising:
forming an insulative nitride cap over the conductive polysilicon layer; and
patterning the layers to form a gate stack.

56. (withdrawn) The method of Claim 53, further comprising:
forming a barrier layer over the doped polysilicon layer;
forming a conductive metal layer over the barrier layer;
forming an insulative nitride cap over the conductive metal layer; and
patterning the layers to form a gate stack.

57. (withdrawn) The method of Claim 53, further comprising:
forming a metal silicide layer over the doped polysilicon layer;
forming an insulative nitride cap over the metal silicide layer; and
patterning the layers to form a gate stack.

58-72. (canceled)

73. (withdrawn – currently amended) A method of forming a nitride barrier layer, comprising:

exposing a dielectric material to a silicon gas under low partial pressure to nucleate the dielectric material and form a continuous layer of silicon; and

exposing the silicon layer on the dielectric material to a nitrogen gas to form a silicon nitride <u>dopant diffusion</u> barrier layer, said barrier layer effective to inhibit passage of a dopant

into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

74. (canceled)

75. (withdrawn – currently amended) A method of forming a nitride barrier layer, comprising:

exposing a dielectric material to a silicon gas under a low partial pressure of about 10^{-2} Torr or less to nucleate the dielectric material and form a continuous layer of silicon; and

exposing the silicon layer on the dielectric material to a nitrogen gas to form a silicon nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

76. (withdrawn – currently amended) A method of forming a nitride barrier layer, comprising:

exposing a dielectric material to a silicon gas by chemical vapor deposition under a low partial pressure of about 10^{-2} Torr or less to nucleate the dielectric material and form a continuous layer of silicon; and

exposing the silicon layer on the dielectric material to a nitrogen gas to form a silicon nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

77. (withdrawn) The method of Claim 76, wherein exposing the dielectric material to the silicon gas comprises rapid thermal chemical vapor deposition conducted at about 500°C. to about 700°C. and a partial pressure of about 10^{-2} Torr or less.

78. (withdrawn) The method of Claim 76, wherein exposing the dielectric material to the silicon gas comprises plasma enhanced chemical vapor deposition.

79. (withdrawn) The method of Claim 76, wherein exposing the dielectric material to the silicon gas comprises low pressure chemical vapor deposition.

80. (withdrawn – currently amended) A method of forming a nitride barrier layer, comprising:

exposing a dielectric material to a silicon gas under low partial pressure of about 10^{-2} Torr or less to deposit a continuous layer of silicon thereon; and

exposing the silicon layer on the dielectric material to a nitrogen gas to form a silicon nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

81. (withdrawn – currently amended) A method of forming a nitride barrier layer, comprising:

exposing a dielectric material to a silicon gas to nucleate the dielectric material and form a continuous layer of silicon; and

thermally annealing the silicon layer on the dielectric material in a nitrogen gas to form a silicon nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

82. (canceled)

83. (withdrawn – currently amended) A method of forming a nitride barrier layer, comprising~~:~~

exposing a dielectric material to a silicon gas under low partial pressure of about 10-^{2} or less to deposit a continuous layer of silicon thereon; and

thermally annealing the silicon layer on the dielectric material in a nitrogen gas to form a silicon nitride dopant diffusion barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material.

84. (withdrawn) The method of Claim 83, wherein thermally annealing is conducted at temperature of about 700°C. to about 900°C.

85. (withdrawn-currently amended) A method of forming a nitride barrier layer, comprising:

exposing a dielectric material to a silicon gas under low partial pressure of about 10^{-2} Torr or less to deposit a continuous layer of silicon thereon; and

nitridizing the silicon layer on the dielectric material with a plasma source of nitrogen to form a silicon nitride <u>dopant diffusion</u> barrier layer, said barrier layer effective to inhibit passage of a dopant into the dielectric material<u>, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the dielectric material</u>.

86. (withdrawn – currently amended) A method of forming a gate electrode, comprising:

exposing a gate oxide layer to a silicon gas under low partial pressure to nucleate the gate oxide layer with a continuous silicon layer; and

exposing the silicon layer on the gate oxide layer to a nitrogen gas to form a silicon nitride <u>dopant diffusion</u> barrier layer, the silicon nitride barrier layer effective to inhibit passage of a dopant into the gate oxide layer<u>, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer</u>.

87. (withdrawn – currently amended) A method of forming a gate electrode, comprising:

exposing a gate oxide layer to a silicon gas by chemical vapor deposition under a low partial pressure of about 10^{-2} Torr or less to nucleate the gate oxide layer and form a continuous layer of silicon; and

exposing the silicon layer on the gate oxide layer to a nitrogen gas to form a silicon nitride <u>dopant diffusion</u> barrier layer; the silicon nitride barrier layer effective to inhibit passage of a dopant into the gate oxide layer<u>, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer</u>.

88. (withdrawn - currently amended) A method of forming a gate electrode, comprising:

exposing a gate oxide layer to a silicon gas under low partial pressure of about 10^{-2} Torr or less to deposit a continuous layer of silicon thereon; and

exposing the silicon layer on the gate oxide layer to a nitrogen gas to form a silicon nitride dopant diffusion barrier layer; the silicon nitride barrier layer effective to inhibit passage of a dopant into the gate oxide layer, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer.

89. (withdrawn - currently amended) A method of forming a gate electrode, comprising:

exposing a gate oxide layer to a silicon gas to nucleate the gate oxide layer and form a continuous layer of silicon; and

thermally annealing the silicon layer on the gate oxide layer in a nitrogen gas to form a silicon nitride dopant diffusion barrier layer, the silicon nitride barrier layer effective to inhibit passage of a dopant into the gate oxide layer, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer.

90. (withdrawn - currently amended) A method of forming a gate electrode, comprising:

exposing a gate oxide layer to a silicon gas under low partial pressure of about 10^{-2} Torr or less to deposit a continuous layer of silicon thereon; and

thermally annealing the silicon layer on the gate oxide layer in a nitrogen gas to form a silicon nitride dopant diffusion barrier layer, the silicon nitride barrier layer effective to inhibit passage of a dopant into the gate oxide layer, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer.

91. (withdrawn - currently amended) A method of forming a gate electrode, comprising:

exposing a gate oxide layer to a silicon gas under low partial pressure of about 10^{-2} Torr or less to deposit a continuous layer of silicon thereon; and

nitridizing the silicon layer on the gate oxide layer with a plasma source of nitrogen to form a silicon nitride dopant diffusion barrier layer, the silicon nitride barrier layer effective to

inhibit passage of a dopant into the gate oxide layer, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer.

92. (withdrawn - currently amended) A method of forming a gate electrode, comprising:

exposing a gate oxide layer to a silicon gas under low partial pressure of about 10^{-2} Torr or less to nucleate the gate oxide layer with a continuous layer of silicon;

exposing the silicon layer on the gate oxide layer to a nitrogen gas to form a silicon nitride dopant diffusion barrier layer, the silicon nitride barrier layer effective to inhibit passage of a dopant into the gate oxide layer, the dopant diffusion barrier layer consisting of silicon and nitrogen overlying and interfacing with the gate oxide layer; and

forming a conductive layer over the silicon nitride barrier layer.

93. (withdrawn) The method of Claim 92, further comprising forming an insulative nitride layer over the conductive layer; and patterning the layers to form a gate stack.

94. (withdrawn) The method of Claim 92, wherein the conductive layer comprises polysilicon comprising a conductivity enhancing dopant, and the nitride barrier layer inhibits passage of the dopant from the conductive polysilicon layer through the barrier layer.

95. (withdrawn) The method of Claim 94, further comprising:

forming a barrier layer over the doped polysilicon layer;

forming a conductive metal layer over the barrier layer;

forming an insulative nitride layer over the conductive metal layer; and

patterning the layers to form a gate stack.

96. (withdrawn) The method of Claim 94, further comprising:

forming a metal silicide layer over the doped polysilicon layer;

forming an insulative nitride cap over the metal silicide layer; and

patterning the layers to form a gate stack.

97. (canceled)

98. (previously presented) The method of Claim 1, wherein the silicon-containing gas is selected from the group consisting of dichlorosilane, silicon tetrachloride, silane, and disilane.

99. (previously presented) The method of Claim 1, wherein exposing the dielectric material to the silicon-containing gas comprises chemical vapor deposition of the silicon gas.

100. (previously presented) The method of Claim 1, wherein exposing the dielectric material to the silicon-containing gas comprises rapid thermal chemical vapor deposition of the silicon gas.

101. (withdrawn) The method of Claim 1, wherein exposing the dielectric material to the silicon gas comprises plasma enhanced chemical vapor deposition of the silicon gas.

102. (withdrawn) The method of Claim 101, wherein exposing the dielectric material to the silicon gas comprises low-pressure chemical vapor deposition of the silicon gas.

103. (previously presented) The method of Claim 1, wherein exposing the silicon layer comprises thermally annealing the silicon layer in a nitrogen-containing gas.

104. (previously presented) The method of Claim 1, wherein exposing the silicon layer comprises a temperature of about 700°C. to about 900°C.

105. (previously presented) The method of Claim 1, wherein exposing the silicon layer comprises a temperature of about 700°C. to about 900°C., a pressure of about 1 to about 760 Torr, and a flow rate of about 100 to about 10,000 sccm for about 1 second to about 180 minutes.

106. (previously presented) The method of Claim 1, wherein the nitrogen-containing gas is selected from the group consisting of nitrogen, ammonia, nitrogen trifluoride, nitrogen oxide, and a nitrogen-helium mixture.

107. (withdrawn) The method of Claim 1, wherein the nitrogen-containing gas comprises a plasma source of nitrogen.

108. (withdrawn) The method of Claim 107, wherein the plasma source of the nitrogen is produced by a downstream microwave system, an electron cyclotron residence system, an inductive coupled plasma system, or a radio frequency system.

109. (withdrawn) The method of Claim 1, wherein exposing the silicon layer comprises a remote microwave plasma source of nitrogen.

110. (withdrawn) The method of Claim 109, wherein exposing the silicon layer comprises a pressure of about 1 to about 20 Torr, and a temperature of about 700°C. to about 900°C.

111. (withdrawn) The method of Claim 1, wherein exposing the silicon layer comprises an inductive coupled plasma source of nitrogen.

112. (previously presented) The method of Claim 1, wherein exposing the dielectric material comprises a partial pressure of about 10^{-2} to about 10^{-7} Torr, a temperature of about 500°C. to about 700°C., and a duration of about 1 second to about 5 minutes.

113. (withdrawn) The method of Claim 1, wherein the dielectric material comprises a gate oxide layer.

114. (withdrawn) The method of Claim 1, further comprising: forming a conductive layer over the silicon nitride barrier layer.

115. (withdrawn) The method of Claim 114, wherein the conductive layer comprises a conductive polysilicon.

116. (withdrawn) The method of Claim 115, wherein the conductive polysilicon layer comprises a conductivity enhancing dopant, and the nitride barrier layer inhibits passage of the dopant from the conductive polysilicon layer therethrough.

117. (withdrawn) The method of Claim 116, wherein the polysilicon layer comprises a boron dopant.

118. (withdrawn) The method of Claim 114, further comprising: forming an insulative nitride cap over the conductive layer.

119. (withdrawn) The method of Claim 118, further comprising: patterning the layers to form a gate stack.

120. (withdrawn) The method of Claim 116, further comprising:
forming a barrier layer over the doped polysilicon layer;
forming a conductive metal layer over the barrier layer;
forming an insulative nitride cap over the conductive metal layer; and
patterning the layers to form a gate stack.

121. (withdrawn) The method of Claim 116, further comprising:
forming a metal silicide layer over the doped polysilicon layer;
forming an insulative nitride cap over the metal silicide layer; and
patterning the layers to form a gate stack.